

No. 3,211,656, U.S. Patent No. 3,238,134 and Skrabeck et al. The Examiner has further rejected Claims 9 and 20 under 35 U.S.C. § 103(a) as being unpatentable over Parise or Tateishi et al., each in view of Wernick, Rupprecht, U.S. Patent No. 3,211,656, U.S. Patent No. 3,238,134 and Skrabeck et al. Applicants respectfully traverse and request reconsideration.

Applicants submit that the thermoelectric compounds claimed in amended Claims 1, 12, 22 and 24 are not disclosed, taught or suggested by the cited references as discussed above. Therefore one of ordinary skill of the art would not have found it obvious to use the thermoelectric compounds of the present invention in the thermoelectric detector of Fraden nor the thermoelectric coolers of either Iwanczyk, Parise or Tateishi et al.


Applicants thus submit that thermoelectric compounds of the amended claims are neither taught nor suggested by the references cited to support the rejection. Applicants therefore respectfully request withdrawal of the rejection.

#### CONCLUSION

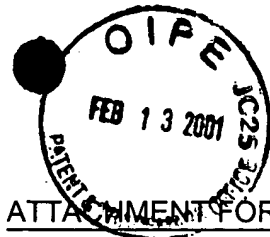
Applicants submit that the claims now stand ready for allowance and such allowance is courteously solicited. Should the Examiner have any questions or wish to further discuss this matter, it is respectfully requested that the Examiner contact the undersigned agent at (248) 641-1600.

Respectfully submitted,

Dated: 7 Feb 2001

By:   
DAVID L. SUTER  
Reg. No. 30,692  
Attorney for Applicant

HARNESS, DICKEY & PIERCE, P.L.C.  
P. O. Box 828  
Bloomfield Hills, MI 48303



ATTACHMENT FOR SPECIFICATION AMENDMENTS

The present invention relates to new isostructural compounds having the general formula  $A_nM_mM'_nQ_{2n+m}$  where A is a metal selected from the group consisting essentially of the alkali metals, lithium (Li), sodium (Na), potassium (K), rubidium (Rb), or cesium (Cs) or the transition metals silver (Ag) or thallium (Tl) and mixtures thereof, M is selected from lead (Pb), tin (Sn), germanium (Ge), calcium (Ca), strontium (Sr), barium ([Ga] Ba), any divalent transition metal and mixtures thereof, M' is selected from bismuth (Bi), antimony (Sb) and mixtures thereof, and Q is selected from the group consisting essentially of sulfur (S), selenium (Se), or tellurium (Te) and mixtures thereof. These compounds possess an NaCl-type cubic lattice crystal structure where A, M and M' occupy the Na sites and Q occupies the Cl (chlorine) sites. This family of compounds combine isotropic morphology, an advantageous property for device processing, with low thermal conductivity and widely ranged electrical conductivity. Further, certain properties such as the electrical properties of the compounds can be controlled by varying the values for n and m. The isostructural compounds of the present invention are therefore good candidates for semiconductor applications in thermoelectronic devices, detectors, and photovoltaic cells, by way of non-limiting example.



ATTACHMENT FOR CLAIM AMENDMENTS

1. (Amended) A conductive material having the general formula  $A_n M_m M'_n Q_{2n+m}$  wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, and Tl  
[, and Ag];

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba  
and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; [and]

Q is at least one element selected from the group consisting of Se, Te and S[.]; and n  
and m are any number greater than 0.

12. (Amended) A solid solution comprising a conductive material having the general  
formula  $A_n M_m M'_n Q_{2n+m}$  wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, and Tl  
[, and Ag];

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba  
and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; [and]

Q is at least one element selected from the group consisting of Se, Te and S[.]; and n  
and m are any number greater than 0.

17. (Amended) The solid solution of Claim 12 wherein the solid solution possesses  
a NaCl-[like] type cubic lattice crystal structure.

22. (Amended) A P-type conductive material comprising:

(a) a conductive material having the general formula  $A_nM_mM'_nQ_{2n+m}$  wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, and Tl [, and Ag];

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; [and]

Q is at least one element selected from the group consisting of Se, Te and S;  
and n and m are any number greater than 0; and

(b) a dopant.

24. (Amended) An N-type conductive material comprising:

(a) a conductive material having the general formula  $A_nM_mM'_nQ_{2n+m}$  wherein:

A is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, and Tl [, and Ag];

M is at least one element selected from the group consisting of Pb, Sn, Ge, Ca, Sr, Ba and any divalent transition metal;

M' is at least one element selected from the group consisting of Bi and Sb; [and]

Q is at least one element selected from the group consisting of Se, Te and S;  
and n and m are any number greater than 0; and

(b) a dopant.

A